Original article

Physical activity levels and associated factors among older adult inpatients with chronic diseases at Hue University of Medicine and Pharmacy Hospital

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Abstract

Background: Physical activity is important for maintaining physical function and independence among older adults with chronic diseases. However, evidence on physical activity among older adult inpatients with chronic diseases remains limited. This study aimed to assess physical activity levels and identify factors associated with sufficient physical activity.

Materials and Methods: A descriptive cross-sectional study was conducted among 200 inpatients aged ≥ 60 years with at least one chronic disease at Hue University of Medicine and Pharmacy Hospital, from April 2025 to April 2026. Data were collected through interviews and medical record review. Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ). Adequate physical activity was defined as ≥ 600 MET-min/week. Factors associated with sufficient physical activity were examined using binary logistic regression.

Results: Overall, 61.5% of participants had sufficient physical activity, while 38.5% had insufficient physical activity. In multivariable analysis, participants aged 70 - 79 years (adjusted odds ratio [aOR] = 0.19, 95% CI: 0.08 - 0.43) and ≥ 80 years (aOR = 0.03, 95% CI: 0.01 - 0.10) had lower odds of sufficient physical activity than those aged 60 - 69 years. Participants with a BMI of 18.5 - 24.9 kg/m² (aOR = 2.90, 95% CI: 1.01 - 8.35) and ≥ 25 kg/m² (aOR = 4.26, 95% CI: 1.11 - 16.36) had higher odds than those with BMI < 18.5 kg/m².

Conclusions: A substantial proportion of the older adult inpatients with chronic diseases had insufficient physical activity. Age and BMI were independently associated with sufficient physical activity. Physical activity assessment and individualized interventions should be considered in the care of this population.

Keywords*: physical activity; older adults; chronic diseases.*

1. INTRODUCTION

Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure [1]. Regular physical activity is important for healthy ageing, helping maintain physical function, mobility, independence, and overall health. However, physical activity declines with age and may be further limited by chronic diseases. Globally, 31.3% of adults, equivalent to approximately 1.8 billion people, did not meet recommended levels of physical activity in 2022, with insufficient physical activity increasing with age, particularly among older adults [2]. In the United States, physical inactivity among adults aged ≥ 50 years with chronic diseases ranged from 29.6% to 37.3% across older age groups [3].

Regular physical activity is particularly important for older adults with chronic diseases because it can help maintain functional capacity and support chronic disease management [1, 4]. In Vietnam, insufficient physical activity has also been reported among older adults. Studies conducted in Hue City found that 35.7% and 29.8% of older adults, respectively, did not meet WHO recommendations for physical activity [5, 6]. Among older adults with hypertension receiving outpatient care in Hanoi, insufficient physical activity was also common [7].

However, most available evidence in Vietnam has focused on community-dwelling older adults, while evidence among hospitalized older adults with chronic diseases, particularly those with multimorbidity, remains limited. Therefore, this study aimed to assess physical activity levels and identify factors associated with sufficient physical activity among older adult inpatients with chronic diseases.

2. MATERIALS AND METHODS

2.1. Study design and participants

A descriptive cross-sectional study was conducted

from April 2025 to April 2026 at Hue University of Medicine and Pharmacy Hospital. The study included inpatients aged ≥ 60 years with at least one chronic disease who were admitted to the Departments of General Internal Medicine-Endocrinology-Musculoskeletal Diseases and Cardiology. Participants were selected using a convenience sampling method and were eligible if they agreed to participate and were able to communicate and complete the study procedures. Eligible participants were interviewed and assessed on the first day of hospital admission after providing informed consent. Patients with mental disorders, cognitive impairment, communication difficulties, or severe complications preventing participation were excluded.

The minimum sample size was calculated using the single-proportion formula:

with = 1,96, p = 0.137 based on a previous study by Nguyen Thi Tam (2022) [8], and d = 0.05, yielding a minimum sample size of 182. Allowing for 10% potential loss or incomplete data, the target sample size was 200 participants.

2.2. Data collection and variables

Data were obtained through structured face-to-face interviews and review of medical records. Interviews were conducted on the first day of hospital admission, after participants had met the eligibility criteria and provided informed consent. Each interview took approximately 20 minutes to complete. The interviews were conducted by 3 trained research staff who were familiar with the study protocol and the administration of the GPAQ. Before data collection, all interviewers received standardized training on the study procedures, questionnaire administration, definitions of study variables, and methods for recording responses. The same standardized questionnaire and interview procedures were used for all participants. For the GPAQ, interviewers followed the standardized wording and instructions and used the same recall period (the 7 days preceding hospital admission) for all participants. Completed questionnaires were checked immediately after each interview for completeness and consistency, and any missing or unclear responses were clarified with the participant when appropriate.

The demographic and clinical characteristics included age, sex, educational level, employment status, number and types of current chronic disease, duration of illness, body mass index (BMI), waist to hip ratio (WHR), smoking, and alcohol consumption. Anthropometric measurements were performed directly on the first day of hospital admission by three trained research staff using standardized procedures. Weight and height were measured without shoes using a calibrated scale and stadiometer, respectively. BMI was calculated as weight (kg)/height² (m^2). Waist and hip circumferences were measured using standard anatomical landmarks, and WHR was calculated as waist circumference divided by hip circumference.

Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ) developed by the World Health Organization (WHO) [9]. The Vietnamese version has demonstrated acceptable reliability and concurrent validity in Vietnamese adults, with a test–retest correlation of r = 0.39 and correlations with IPAQ (r = 0.32), pedometer-measured steps (r = 0.39), and a 7-day physical activity log (r = 0.31), supporting the reliability and validity of the GPAQ for assessing physical activity in the Vietnamese population [10]. The GPAQ consists of 16 questions assessing physical activity in three domains: occupational activity (P1-P6), transport-related activity (P7-P9), and recreational activity (P10-P15), as well as time spent sitting or reclining (P16) [9]. Physical activity was quantified in MET-minutes/week according to the WHO GPAQ analysis guide [9]. The total physical activity score was calculated by summing vigorous and moderate activities across the three domains.

ΣMET-minutes/week= [(P2×P3×8)+(P5×P6×4)+(P8×P9×4)+(P11×P12×8)+(P14×P15×4)]

In accordance with the WHO GPAQ Analysis Guide, participants were considered to meet the minimum recommended level of physical activity if their total physical activity was ≥ 600 MET-minutes/week. Participants with < 600 MET-minutes/week were classified as having insufficient physical activity [9].

2.3. Statistical analysis

Data were analyzed using IBM SPSS Statistics version 20.0. Categorical and continuous variables were presented as frequencies (%) and mean ± SD, respectively. Binary logistic regression was used to identify factors associated with sufficient physical activity. Variables with $p < 0.20$ in univariable analyses were considered for multivariable analysis. Multicollinearity was assessed using VIF and tolerance; variables with VIF ≥ 5 or tolerance ≤ 0.20 were considered potentially collinear. Because individual chronic disease categories overlapped clinically and statistically with the number of chronic diseases, individual disease categories were not entered into the final multivariable model, and the number of chronic diseases was retained as the indicator of disease burden. Adjusted odds ratios (aORs) with 95% CIs were reported, with $p < 0.05$

considered statistically significant.

2.4. Ethics

The study was conducted after approval by the Biomedical Research Ethics Committee of Hue University of Medicine and Pharmacy, Hue University (Approval number: H2025/430, dated May 23, 2025). Participation was voluntary, and all collected information was coded and kept confidential.

3. RESULTS

3.1. Sociodemographic and clinical characteristics of participants

Table 1. Sociodemographic characteristics of participants (n=200)

Characteristics	n (%) or Mean ± SD (min-max)
Age (years)	69.63 ± 8.59 (60 - 92)
60 - 69	118 (59.0)
70 - 79	50 (25.0)
≥ 80	32 (16.0)
Sex	
Male	81 (40.5)
Female	119 (59.5)
Education level	
No schooling and primary school	92 (46.0)
Secondary school	65 (32.5)
High school and higher	43 (21.5)
Employment status	
Homemaker	22 (11.0)
Retired	15 (7.5)
Trade/services	11 (5.5)
Not employed	152 (76.0)

The mean age of participants was 69.63 ± 8.59 years (range: 60 - 92), with 59.0% aged 60 - 69 years. Females accounted for 59.5% of the sample. Nearly half of the participants had no schooling or primary education (46.0%), and most were not employed (76.0%).

Table 2. Clinical characteristics of participants (n = 200)

Characteristics	n (%) or Mean ± SD
Chronic disease*	
Digestive disease	57 (12.9)
Cardiovascular disease	158 (35.8)
Neuropathy	91 (20.6)
Musculoskeletal disease	82 (18.6)
Renal and urological diseases	14 (3.2)
Endocrine disease	39 (8.8)
Number of chronic diseases	2.20 ± 0.96 (1 - 5)
1	54 (27.0)
≥ 2	146 (73.0)
Duration of chronic disease (years)	7.21 ± 6.02 (0.10 - 32)
≤ 5	107 (53.5)
> 5 - 10	51 (25.5)
> 10	42 (21)

BMI	21.96 ± 3.24 (14.17 - 32.03)
< 18.5	27 (13.5)
18.5 - 24.9	141 (70.5)
≥ 25	32 (16.0)
WHR	0.85 ± 0.08 (0.64 - 1.10)
Increased (≥ 0.8)	152 (76.0)
Normal (< 0.8)	48 (24.0)
Smoking	
Yes	89 (44.5)
No	111 (55.5)
Alcohol	
Yes	85 (42.5)
No	115 (57.5)

Note: ** Participants could report more than one chronic condition; therefore, percentages do not sum to 100%.*

As shown in Table 2, cardiovascular disease was the most common chronic condition (35.8%), followed by neuropathy (20.6%) and musculoskeletal disease (18.6%). Most participants had two or more chronic diseases (73.0%), with a mean of 2.20 ± 0.96 conditions. The mean duration of chronic disease was 7.21 ± 6.02 years. Most participants had a normal BMI (70.5%), while 76.0% had an increased WHR. Smoking and alcohol use were reported by 44.5% and 42.5% of participants, respectively.

3.2. Physical activity levels among older adult inpatients with chronic diseases

Table 3. Physical activity patterns of participants (n = 200)

Physical activity patterns	Mean ± SD (MET-minutes/week)	Min-max
Vigorous work activity	76.80 ± 480.46	0 - 3360
Moderate work activity	331.80 ± 798.71	0 - 3360
Walking/cycling for transportation (TPA)	1131.48 ± 1112.42	0 - 8456
Vigorous recreational activity	0	0 - 0
Moderate recreational activity	97.80 ± 279.83	0 - 1680
GPAQ	1637.88 ± 1981.18	0 - 10920

Physical activity was reported across work-related, transportation-related, and recreational domains. Walking or cycling for transportation had the highest mean physical activity score (1131.48 ± 1112.42 MET-minutes/week), followed by moderate work activity (331.80 ± 798.71 MET-minutes/week). Vigorous work activity and moderate recreational activity had lower mean values of 76.80 ± 480.46 and 97.80 ± 279.83 MET-minutes/week, respectively. None of the participants reported vigorous recreational activity. The mean total physical activity score measured by the GPAQ was 1637.88 ± 1981.18 MET-minutes/week, with values ranging from 0 to 10,920 MET-minutes/week.

Table 4. Physical activity levels of participants (n = 200)

Physical activity level	n (%)
Insufficient physical activity	77 (38.5)
Sufficient physical activity	123 (61.5)

As shown in Table 4, 123 participants (61.5%) had sufficient physical activity, whereas 77 (38.5%) had insufficient physical activity.

3.3. Factors associated with physical activity level among older adult inpatients with chronic diseases

Table 5. Univariable logistic regression analysis of factors associated with sufficient physical activity (n = 200)

Characteristics		Physical activity level		OR (95% CI)	p
		Insufficient n (%)	Sufficient n (%)		
Age (years)	60 - 69	21 (17.8)	97 (82.2)	1	
	70 - 79	27 (54.0)	23 (46.0)	0.18 (0.09 - 0.38)	**< 0.001**
	≥ 80	29 (90.6)	3 (9.4)	0.02 (0.01 - 0.08)	**< 0.001**
Sex	Male	26 (32.1)	55 (67.9)	1	
	Female	51 (42.9)	68 (57.1)	1.59 (0.88 - 2.86)	0.126
Education level	No schooling and primary school	48 (52.2)	44 (47.8)	1	
	Secondary school	19 (29.2)	46 (70.8)	2.64 (1.35 - 5.18)	**0.005**
	High school and higher	10 (23.3)	33 (76.7)	3.60 (1.59 - 8.15)	**0.002**
Employment status	Homemaker	7 (31.8)	15 (68.2)	1	
	Retired	4 (26.7)	11 (73.3)	1.28 (0.30 - 5.94)	0.737
	Trade/services	3 (27.3)	8 (72.7)	1.24 (0.25 - 6.17)	0.789
	Not employed	63 (41.4)	89 (58.6)	0.66 (0.25 - 1.71)	0.392
Chronic disease*	Digestive disease	28 (49.1)	29 (50.9)	0.54 (0.29 - 1.01)	0.053
	Cardiovascular disease	65 (41.1)	93 (58.9)	0.57 (0.27 - 1.20)	0.140
	Neuropathy	42 (46.2)	49 (53.8)	0.55 (0.31 - 0.98)	**0.043**
	Musculoskeletal disease	32 (39.0)	50 (61.0)	0.96 (0.54 - 1.72)	0.899
	Renal and urological diseases	6 (42.9)	8 (57.1)	0.82 (0.27 - 2.47)	0.729
	Endocrine disease	11 (28.2)	28 (71.8)	1.77 (0.82 - 3.80)	0.144
Number of chronic diseases	1	16 (29.6)	38 (70.4)	1	
	≥ 2	61 (41.8)	85 (58.2)	0.59 (0.30 - 1.15)	0.119
Duration of chronic disease (years)	≤ 5	32 (29.9)	75 (70.1)	1	
	> 5 - 10	22 (43.1)	29 (56.9)	0.56 (0.28 - 1.12)	0.103
	> 10	23 (54.8)	19 (45.2)	0.35 (0.17 - 0.74)	**0.005**

BMI	< 18.5	13 (48.1)	14 (51.9)	1	
	18.5 - 24.9	56 (39.7)	85 (60.3)	1.41 (0.62 - 3.22)	0.416
	≥ 25	8 (25.0)	24 (75.0)	2.79 (0.93 - 8.37)	0.068
WHR	Normal (< 0.8)	21 (43.8)	27 (56.2)	1	
	Increased (≥ 0.8)	56 (36.8)	96 (63.2)	1.33 (0.69 - 2.58)	0.392
Smoking	Yes	30 (33.7)	59 (66.3)	1	
	No	47 (42.3)	64 (57.7)	0.69 (0.39 - 1.24)	0.213
Alcohol	Yes	29 (34.1)	56 (65.9)	1	
	No	48 (41.7)	67 (58.3)	0.72 (0.40 - 1.29)	0.274

Note: ** Participants could report more than one chronic condition; therefore, percentages do not sum to 100%.*

In the univariable logistic regression analysis, older age was significantly associated with lower odds of sufficient physical activity. Compared with participants aged 60 - 69 years, those aged 70 - 79 years and ≥ 80 years had significantly lower odds of sufficient physical activity (OR = 0.18, 95% CI: 0.09 - 0.38, p < 0.001 and OR = 0.02, 95% CI: 0.01 - 0.08, p < 0.001, respectively). Higher education levels were associated with higher odds of sufficient physical activity. Neuropathy and longer duration of chronic disease (> 10 years) were also significantly associated with lower odds of sufficient physical activity. Other characteristics were not significantly associated with sufficient physical activity (p > 0.05).

Table 6. Multivariable logistic regression analysis of factors associated with sufficient physical activity (n = 200)

Characteristics		Adjusted OR (95% CI)	p
Age (years)	60 - 69	1	
	70- 79	0.19 (0.08 - 0.43)	**< 0.001**
	≥ 80	0.03 (0.01 - 0.10)	**< 0.001**
Sex	Male	1	
	Female	0.63 (0.28 - 1.43)	0.265
Education level	No schooling and primary school	1	
	Secondary school	1.41 (0.59 - 3.35)	0.440
	High school and higher	1.76 (0.63 - 4.93)	0.283
Number of chronic diseases	1	1	
	≥ 2	0.88 (0.38 - 2.03)	0.772
Duration of chronic disease (years)	≤ 5	1	
	> 5 - 10	1.16 (0.48 - 2.80)	0.749
	> 10	0.79 (0.30 - 2.09)	0.641
BMI	< 18.5	1	
	18.5 - 24.9	2.90 (1.01 - 8.35)	**0.049**
	≥ 25	4.26 (1.11 - 16.36)	**0.035**

In the multivariable logistic regression analysis, age and BMI were associated with sufficient physical activity in the multivariable model. Compared with participants aged 60 - 69 years, those aged 70 - 79 years and ≥ 80 years had significantly lower odds of sufficient physical activity (aOR = 0.19, 95% CI: 0.08 - 0.43, p < 0.001 and aOR = 0.03, 95% CI: 0.01 - 0.10, p < 0.001, respectively). Compared with participants with BMI < 18.5 kg/m²,

those with BMI of 18.5 - 24.9 kg/m² and ≥ 25 kg/m² had higher odds of sufficient physical activity (aOR = 2.90, 95% CI: 1.01 - 8.35, p = 0.049 and aOR = 4.26, 95% CI: 1.11 - 16.36, p = 0.035, respectively). Sex, education level, number of chronic diseases, and duration of chronic disease were not significantly associated with sufficient physical activity after adjustment (p > 0.05).

4. DISCUSSION

4.1. Physical activity levels among older adult inpatients with chronic diseases

In this study, 61.5% of older inpatients with chronic diseases achieved sufficient physical activity, whereas 38.5% had insufficient physical activity. Although the majority met the predefined threshold of ≥ 600 MET-min/week, the proportion with insufficient physical activity remains clinically relevant because regular physical activity is important for maintaining functional capacity and health among older adults with chronic diseases [1, 4]. This finding is comparable with previous studies conducted in the same geographical area. Tran et al. reported that 35.7% of older adults in Hue city had insufficient physical activity [5], while Nguyen et al. reported a lower proportion of 29.8% among older adults in Hue City [6]. The higher proportion observed in our study may be related to the fact that our participants were hospitalized and had at least one chronic disease, whereas the previous studies were conducted mainly in community-dwelling older adults.

Our findings also indicate that transportation-related activity contributed substantially to total physical activity. This may partly explain the relatively high overall activity level despite the participants' chronic disease burden. However, the presence of insufficient physical activity in more than one-third of participants highlights the need for physical activity assessment during clinical care. Previous studies have shown that higher physical activity is associated with better health outcomes among adults with chronic diseases and older populations [4, 11-13].

4.2. Factors associated with physical activity level among older adult inpatients with chronic diseases

Age was the strongest factor associated with sufficient physical activity. After adjustment, participants aged 70 - 79 and ≥ 80 years had substantially lower odds of sufficient physical activity than those aged 60 - 69 years. This finding is consistent with global evidence showing that insufficient physical activity increases with age [2] and with data from the United States indicating considerable physical inactivity among adults aged ≥ 50 years with chronic diseases, particularly those aged ≥ 75 years [3]. The decline in physical activity with advancing age may reflect reduced physical capacity and mobility, although these factors were not directly assessed in our study.

In contrast, participants with BMI 18.5 – 24.9 and ≥ 25 kg/m² had higher odds of sufficient physical activity than those with BMI < 18.5 kg/m². In older adults, low BMI may coexist with undernutrition, reduced muscle mass, and poorer physical function, which can limit mobility and daily physical activity. Evidence also suggests that nutritional and physical-function factors are closely related to frailty and mobility in older adults [4]. Therefore, the higher odds of sufficient physical activity observed among participants with higher BMI may partly reflect differences in nutritional and functional status rather than a direct effect of BMI on physical activity. Further studies should incorporate nutritional status, muscle mass, muscle strength, and functional capacity when examining this association.

Although 73.0% of participants had two or more chronic diseases, multimorbidity was not independently associated with sufficient physical activity after adjustment. Similarly, disease duration, sex, and education were not independently associated with sufficient physical activity. Previous studies have reported associations between physical activity and selected chronic conditions, including hypertension [14], chronic kidney disease [15], and chronic obstructive pulmonary disease [16], while studies among older populations have also demonstrated associations between physical activity and chronic disease status [13, 17]. Differences in study populations, disease characteristics, and methods of physical activity assessment may partly explain these variations.

Overall, our findings suggest that age and BMI were the only independent factors associated with sufficient physical activity among older inpatients with chronic diseases. Routine assessment of physical activity may therefore be particularly important for patients aged ≥ 70 years and those with low BMI. Interventions should be individualized according to patients' clinical condition and functional capacity [1, 11]. However, this study has several limitations. First, the cross-sectional design precludes causal inference. Second, convenience sampling from a single hospital may limit the generalizability of the findings. Third,

physical activity was self-reported using the GPAQ and may be affected by recall or reporting bias, particularly when recalling physical activity during the preceding 7 days. Fourth, some subgroups had relatively small sample sizes, particularly participants aged ≥ 80 years and those with a BMI < 18.5 kg/m², which may have resulted in wide confidence intervals and less stable regression estimates. Fifth, functional status, frailty, and other psychosocial factors were not assessed. In addition, because physical activity was assessed during the 7 days preceding hospital admission, reported physical activity may have been influenced by the health condition, worsening symptoms, or acute exacerbation of chronic diseases that led to hospitalization. Therefore, the physical activity levels assessed in this study reflect activity before hospital admission and do not capture changes in physical activity during the inpatient stay. Consequently, these findings should not be interpreted as representing patients' physical activity levels throughout hospitalization.

5. CONCLUSION

Among older adult inpatients with chronic diseases, 61.5% had sufficient physical activity and 38.5% had insufficient physical activity according to the WHO GPAQ criteria. In the multivariable analysis, age and BMI were independently associated with sufficient physical activity. Participants aged 70 - 79 years and ≥ 80 years had significantly lower odds of sufficient physical activity than those aged 60 - 69 years, whereas those with BMI of 18.5 - 24.9 kg/m² and ≥ 25 kg/m² had significantly higher odds than those with BMI < 18.5 kg/m². These findings indicate that age and BMI were associated with physical activity levels in this population and may be relevant when assessing physical activity among older adult inpatients with chronic diseases. Given the cross-sectional design, these associations should not be interpreted as causal relationships.

Practice implications

Routine assessment of physical activity may be incorporated into the comprehensive assessment of older adult inpatients with chronic diseases. Age and BMI may be considered when identifying patients who may benefit from further assessment of their physical activity and functional status. Where clinically appropriate, physical activity counseling and encouragement of safe daily movement may be incorporated into individualized inpatient care, taking into account each patient's clinical condition and functional capacity. Guidance on maintaining appropriate physical activity after discharge may also be considered as part of discharge planning. Further longitudinal and interventional studies are needed to determine whether such approaches can improve physical activity levels in this population.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest related to this study, its authorship, or the publication of this article.

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